LETTERS TO THE EDITOR

Angioscopy After Coronary Excimer Laser Angioplasty

We read with interest the experimental study of Sanborn et al. (1) on coronary excimer laser angioplasty, a technique that continues to generate considerable enthusiasm (2) despite less than glowing reports of its clinical effectiveness with the current investigational models (3,4).

In our Food and Drug Administration-approved study of intraoperative 308 nm excimer laser ablation used adjunctively in coronary vessels scheduled for bypass grafting, we employed angioscopy to view surface morphology and record any excimer-induced intraluminal effects. An example of this intravascular visualization might contribute to an understanding of the clinical outcome investigators have seen with current excimer laser technology.

We successfully recanalized a 95% stenosis in a right coronary artery with pulsed excimer laser energy (179 pulses at 40 mJ/mm^2 and 10 Hz) delivered by a multifiber probe (13 × 200 μm in a 4.5F coaxial catheter with a 0.014 in. (0.036 cm central guide wire channel (Spectranetics).

We then performed intraoperative angioscopy using a 2.3 mm disposable angioscope (model 2300, Baxter Healthcare) connected to a Panasonic medical video color monitor (model MT-1340G) and a Sony videorecorder (VO-9600). (The large diameter angioscope was used because of its better resolution, and care was taken to minimize scope trauma by passing the device only twice.)

Although there was no carbonization to give evidence of thermal damage, we saw plaque fractures and an unexpected abundance of tissue remnants hanging from the vessel wall (Fig. 1). We could not conclusively document these flaps on the completion arteriogram, which at best showed a "fuzzy" vessel wall. We corroborated these observations in a similarly treated explanted human heart.

These findings also parallel those we have seen angioscopically in the peripheral arteries with the excimer laser. We can postulate several mechanisms for this irregular recanalization. One is due to the heterogeneous composition of plaque. The various components may have different ablation thresholds that respond unevenly to excimer irradiation, leaving the more resistant tissues as remnants.

A feasible technical explanation may be an off-axis swinging of the probe as it is being advanced. Even a slight swing would be sufficient to vary the incident angle, so that the laser beam slices into the lesion unevenly rather than tunneling a coaxial, cylindrical, smooth track through the obstruction as observed in the in vitro experiments.

Our early experience with the excimer laser falls short of expectations. We have not seen the purported uniform effectiveness against calcified atheroma, having been able to obtain only a 60% success rate in such lesions (4). Moreover, the probes are still technically inadequate and perforation is too frequent. Indeed, the deficiencies in the probe may be the primary cause of these suboptimal observations.

Whatever the source of the jagged channels created by the excimer probe, the effects can be evaluated only in long-term follow-up. A recent report by Karsch and associates (3) documented a 6-month restenosis rate of 47% in 47 patients restudied arteriographically after percutaneous coronary excimer angioplasty. We are anxious to see in our own patients if adequate patency can be achieved in treated vessels despite this irregular recanalization. As proved true in our peripheral program (5), direct assessment of the laser angioplasty site is of critical importance in assessing the results (or lack thereof) after intervention.

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Figure 1. Angioscopic view of a right coronary artery after intraoperative excimer laser angioplasty. Plaque fractures are present, and arteriographically undetected tissue remnants are clearly visible hanging from the vessel wall.

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